

Remarks/Arguments

Responsive to paragraph 1 of the Office Action, replacement sheets containing corrected Figs. 3A and 3B and Figs. 4a and 4b are enclosed herewith. In particular, the original photograph of Fig. 3 has been replaced by a drawing comprising the diagrammatic views of Figs 3A and 3B to show the subject matter described in the application relating to Fig. 3. Figs. 4a and 4b in the replacement sheet are believed to overcome the objections set forth in the PTO-948 form.

Responsive to paragraph 3 of the Office Action the matter is believed to be resolved by the replacement sheet containing Figs. 3A and 3B submitted herewith.

Turning now to the rejection of claims 1-4, 6-9 and 12 under 35 USC 112 set forth in paragraph 5 of the Office Action, claim 1 has been amended to clarify the role provided by the secondary explosive charge in response to the Examiner's comments. Claims 1-4, 6-9 and 12 as amended are believed to satisfy the requirements of 35 USC 112, first paragraph.

Reconsideration of the rejections of claims 1-4, 6-9 and 12 under 35 USC 112 set forth in paragraph 6 and in paragraph 7a of the Office Action is respectfully requested for the following reason. The basis for these two rejections appear to be the same as the basis for the rejection in paragraph 5 of the Office Action in view of the Examiner's statement "See the discussion of this issue in section 5 above". Accordingly, the rejections of claims 1-4, 6-9 and 12 under 35 USC 112 set forth in paragraphs 6 and 7a of the Office Action are believed to be overcome by the amendment to claim 1 discussed in connection with paragraph 5 of the Office Action.

Claims 1 and 8 have been amended in a manner believed to overcome the §112 rejections set forth in paragraphs 7b, 7c and 7d of the Office Action.

Reconsideration of the rejection of claims 1-3, 7-9 and 12 under 35 USC 103 based on Aitchison et al. in view of the 1942 Explosives and Demolitions Engineer Field Manual and Britton et al. is respectfully requested for the following reasons.

Aitchison et al. teach an inflatable expansible plastic tube for filling a drill hole with freely flowing explosives obviating water seepage (line 41 at col. 1). The inflatable tube should contact the side walls of the hole (claim 1), and therefore any expansions in the cylindrical shaft should not much exceed the diameter for the cylinder, otherwise the plastic tube could not be inflated as claimed in claim 1 and as shown in figures 4-6. An onion of applicant's invention has a diameter much larger than the diameter of the cylindrical part (e.g., 1 meter compared to 8 inches). The shapes of the drill holes disclosed in the Aitchison patent are entirely different from applicant's shape, e.g. as shown in figure 2a. Any expanded sections disclosed by Aitchison et al. are not created by explosions of initial small charges, as in the present invention, and the expanded sections of Aitchison et al. are not intended to direct the blast evenly to all directions, as in the case of close-to-spherical "onions" of the instant invention.

The recitations in claim 1 make the differences between applicant's invention, as described in claim 1, and the Aitchison patented invention very clear. A blasting method for open mines and excavations comprising an array of onion drill holes of applicant's invention has nothing to do with a method

for charging a flowing explosive into a blast hole. The former is a blasting method, the latter is a filling method; the former has an array of drill holes, the latter a hole; the former has one lowermost, close-to spherical extension with a diameter much larger than the cylindrical part, the latter has any number of extensions (e.g., claim 12) situated in any height (Fig. 3); the former uses an initial, relatively small charge to create the spherical extension, the latter uses flame piercing (line 45 at col. 1); the former pulverizes the rock around the extension, as well as on the surface, the latter reduces danger of premature explosion (line 51 at col. 1); etc.

The 1942 Explosives and Demolitions Engineer Field Manual does not disclose anything having a bearing on the reasons why amended claim 1 is believed to patentably distinguish over Aitchinson et al. The Manual does not disclose using an array of onion-shaped drill holes having cylindrical upper part and lowermost near-to-spherical part, employing three different charges: initial charge; primary charge; and secondary charge; wherein the initial charge, creating the lowermost part, is smaller than the primary charge, and two buffer layers, and simultaneously detonating the primary and secondary charges, thereby pulverizing the rock mass between the lowermost part and the ground surface.

Britton et al. do not disclose anything having a bearing on the reasons why amended claim 1 is believed to patentably distinguish over Aitchinson et al. Britton et al. are concerned with converting subterranean rock into an enclosed rubble-ized zone overlain by an overburden including lifting an area of overburden as a substantially monolithic land mass to produce a void space and a free face and exploding a charge in the rock

proximate the face to produce fracture previous rubble-sized rock in a defined enclosed zone. Britton et al do not disclose a blasting method for open mines and excavations which uses an array of onion-shaped drill holes having cylindrical upper part and lowermost near-to-spherical part, employs three different charges initial charge, primary charge, and secondary charge, wherein the initial charge, creating the lowermost part, is much smaller than the primary charge, and two buffer layers, and which simultaneously detonates the primary and secondary charges, thereby pulverizing the rock mass between the lowermost part and the ground surface.

Accordingly, amended claim 1 and dependent claims 2, 7, 10-12, 14 and 16 are believed to patentably distinguish over Aitchison et al., the Manual and Britton et al. within the meaning of 35 USC 103.

Reconsideration of the rejection of claims 1-4, 6-9 and 12 under 35 USC 103 based on Aitchinson et al. in view of the 1942 Manual and Britton et al. further in view of Grant and/or Merriam Webster's Collegiate Dictionary is respectfully requested for the following reasons. Amended claim 1 is believed to patentably distinguish over Aitchinson et al., the 1942 Manual and Britton et al for the reasons set forth above. Grant does not disclose anything considered to have a bearing on the reasons why amended claim 1 is believed to patentably distinguish over Aitchinson et al., the 1942 Manual and Britton et al.

While Grant teaches some geometrical features of cavities created by underground explosions which may be utilized, and when excavating ratio of diameters for cylindrical/spherical

parts might be calculated from the cited document, but Grant's mathematical teaching, even if combined with Aitchinson's inflatable tube, does not make obvious the instant array of onions for open mines and excavations, comprising three different explosive charges and two buffer layers according to applicant's invention.

The Dictionary definitions cited by the Examiner are not considered to weaken support for applicant's position regarding the prior art references.

Accordingly, amended claim 1 and dependent claims 2-4, 6-9 and 12 are believed to patentably distinguish over Aitchison et al., the 1942 Manual, Britton et al., Grant and the Dictionary within the meaning of 35 USC 103.

The rejection of claim 7 under 35 USC 103 based on Aitchison et al., the 1942 Manual, Britton et al., Grant, the Dictionary and Avanci et al. is respectfully traversed. Dependent claim 7 includes all the limitations of amended claim 1 which, for the reasons set forth above, is believed to patentably distinguish over Aitchison et al., the 1942 Manual, Britton et al., Grant and the Dictionary. Avanci et al. do not disclose anything considered to have a bearing on the reasons why amended claim 1 is believed to patentably distinguish over the above-noted prior art references.

The Examiner admits that the ratio values of claim 7 are not disclosed in the cited documents, but assumes that these values would be easily derived by a skilled person. However, even the cited passages show how difficult it would have been to come to the values claimed in the instant application when combining the values inferred from the prior art. Avanci is

cited as giving 10 and 30m for the depth (lines 51 to 52), but he also gives 25 to 60 mm for the shot hole - corresponding to the instant cylindrical diameter of 8 inches. Even a retrospective search for values similar to the instant values would not provide the instant 13 meter depth and 200 mm diameter of instant claim 7 from Avanci's 10-30 m and 25-60 mm. Anyway, it is believed that Avanci's method for geological tests would hardly lead a skilled person, searching for novel surface excavations, to applicant's invention.

Accordingly, dependent claim 7 is believed to patentably distinguish over Aitchison et al., the 1942 Manual, Britton et al., Grant, the Dictionary and Avanci et al. within the meaning of 35 USC 103.

Reconsideration of the rejection of claim 9 under 35 USC 103 based on Aitchison in view of the 1942 Manual and Britton et al. and admitted prior art is respectfully requested for the following reasons. The Examiner suggests that Figure 4 implies that the distances (Fig. 4a, claim 9) would be easily derived from the prior art distances as shown in Fig. 4b. Applicant wishes to point out that claim 9 represents one of embodiments, and the drawing intends to illustrate the fact that applicant's invention enables, due to higher efficiency and impact of the method, using lower number of drill holes, when compared to prior art drilling methods used in open mines and excavations (as also referred to in Background of the Invention). Accordingly, dependent claim 9, which includes all the limitations of amended claim 1, is believed to patentably distinguish over the prior art references cited by the Examiner.

In conclusion, the combination of features providing an

efficient and cheap blasting method of applicant's invention is not obvious from the cited prior art. For example, the cited values of distances and diameters are selected from many other possible values; Avanci might be cited as giving 3 m (10 feet, line 46 at col. 5) for the onion height, and Grant as giving 26-60 mm for the cylindrical diameter, whereas applicant's invention prefers 1 m and 200 mm. However, it is not the combination of dimensions that makes applicant's method more efficient and cheaper for blasting in open mines and excavations, but the combination of other features. This invention has attained objects of reducing amounts of explosives, number of drilling holes, and costs of drilling during blasting larger areas (instant pages 3 and 16). None of the cited prior art documents, alone or in combination, can teach a skilled person a combination of the following elements:

- the blasting method for open mines and excavations,
- using an array of onion-shaped drill holes having cylindrical upper part and lowermost near-to-spherical part,
- employing three different charges initial charge, primary charge, and secondary charge, wherein the initial charge, creating the lowermost part, is smaller than the primary charge, and two buffer layers, and
- simultaneously detonating the primary and secondary charges, thereby pulverizing the rock mass between the lowermost part and the ground surface.

It is, therefore, respectfully submitted that amended claim

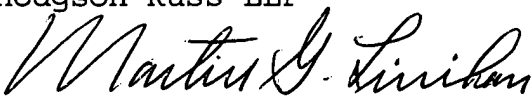
1 and dependent claims 2-4, 6-9 and 12 define a novel and inventive blasting method for open mines and excavations.

Favorable action on this application is respectfully requested.

Respectfully submitted,

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